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## AMENDMENTS TO THE CLAIMS

## Listing of All Claims Showing Changes Made

- 1 1. (Previously Presented) A high-impedance optical electrode used for measuring bio-
- 2 potentials comprising:
- 3 a) a light source;
- 4 b) an electro-optic modulator:
- 5 (1) receiving light from said light source;
- 6 (2) modulating said light in response to a bio-potential; and
- 7 (3) providing a modulated light output proportional to said bio-potential;
- 8 c) a photodetector for receiving and converting said modulated light output from said
- 9 electro-optic modulator to an electrical signal;
- 10 d) electronic circuitry for providing an electronic output signal; and
- 11 e) a pilot tone generated by said electronic circuitry and superimposed on said bio-
- 12 potential.

## 2-4. (Canceled)

- 1 5. (Previously Amended) A high-impedance optical electrode used for measuring bio-
- 2 potentials comprising:
- 3 a) a light source;
- 4 b) an electro-optic modulator:
- 5 (1) receiving light from said light source;
- 6 (2) modulating said light in response to a bio-potential; and
- 7 (3) providing a modulated light output proportional to said bio-potential;
- 8 c) an optical splitter for splitting said light from said light source into at least a second
- 9 light portion wherein said second light portion is used as an optical reference signal.

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1 6. (Previously Amended) The high-impedance optical electrode used for measuring

- 2 bio-potentials according to claim 5 wherein a third light portion is received by a second
- 3 electro-optical modulator.
- 1 7. (Canceled)
- 1 8. (Previously Amended) The high-impedance optical electrode used for measuring
- 2 bio-potentials according to claim 5 further comprising an optical phase-shift modulator.
- 1 9. (Previously Amended) A high impedance optical electrode for measuring bio-
- 2 potentials comprising:
- a) a light source;
- 4 b) a bio-potential;
- 5 c) an electro-optic modulator;
- 6 (1) receiving light from said light source;
- 7 (2) modulating said light in response to a bio-potential; and
- 8 (3) providing a modulated light output;
- 9 d) a photodetector for receiving and converting said modulated light output from
- said electro-optic modulator into an electrical output; and
- e) wherein at least one end of said electro-optic modulator connected to at least
- one member of a group of members consisting of: an optical fiber, said light
- source, and said photodetector, is formed at an angle to vertical.
- 1 10. (Original) The high impedance optical electrode according to claim 9 wherein said
- 2 electrical output is a voltage.
- 1 11. (Original) The high impedance optical electrode according to claim 9 wherein said
- 2 light source is a laser diode.

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1 12. (Original) The high impedance optical electrode according to claim 11 wherein

2 said laser diode is a highly coherent laser diode.

- 1 13. (Original) The high impedance optical electrode according to claim 11 wherein said
- 2 laser diode is a low coherent laser diode.
- 1 14. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 9 wherein said light source is a distributed feedback laser.
- 1 15. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 9 wherein said light source is a Fabry-Perot laser.
- 1 16. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 9 wherein said light source is a vertical cavity surface-emitting laser.
- 1 17. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 9 wherein said light source is connected to said electro-optic
- 3 modulator with an optical fiber.
- 1 18. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 9 wherein said electro-optic modulator is connected to said
- 3 photodetector with an optical fiber.
- 1 19. (Original) The high impedance optical electrode for measuring bio-potentials.
- 2 according to claim 17 wherein said electro-optic modulator is connected to said
- 3 photodetector with an optical fiber.

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1 20. (Canceled)

- 1 21. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 9 wherein at least one end of said electro-optic modulator is
- 3 connected to an optical fiber with an optical carrier.
- 1 22. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 21 wherein an end of said optical carrier connected to said electro-
- 3 optic modulator is formed at an angle to vertical.
- 1 23. (Previously Amended) A high impedance optical electrode for measuring bio-
- 2 potentials comprising:
- 3 a) a light source;
- 4 b) a bio-potential;
- 5 c) an electro-optic modulator;
- 6 (1) receiving light from said light source;
- 7 (2) modulating said light in response to a bio-potential; and
- 8 (3) providing a modulated light output;
- 9 d) a photodetector for receiving and converting said modulated light output from said
- 10 electro-optic modulator into an electrical output; and
- 11 e) wherein at least said electro-optic modulator is enclosed in a housing at least
- 12 partially covered with electro-magnetic shielding wherein said electro-magnetic
- 13 shielding is a conductive paint.
- 1 24. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 23 wherein said housing is hermetically sealed.

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1 25-26. (Canceled)

- 1 27. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 23 wherein said housing provides a ground return.
- 1 28. (Previously Amended) A high impedance optical electrode for measuring bio-
- 2 potentials comprising:
- 3 a) a light source;
- 4 b) a bio-potential;
- 5 c) an electro-optic modulator;
- 6 (1) receiving light from said light source;
- 7 (2) modulating said light in response to said bio-potential; and
- 8 (3) providing a modulated light output;
- 9 d) wherein said electro-optic modulator is a Mach- Zehnder interferometer comprising a
- 10 substrate having formed therein:
- 11 (1) a light input wave-guide receiving light from said light source;
- 12 (2) a splitter connected to said light input wave-guide;
- (3) a first leg light wave-guide connected to said splitter;
- 14 (4) a second leg light wave-guide connected to said splitter;
- 15 (5) a combiner connected for receiving light from said first leg light wave-guide
- and said second leg light wave-guide; and
- 17 (6) a light output wave-guide connected to said combiner;
- 18 (7) a bio-potential plate mounted on said substrate between said first leg light
- wave-guide and said second light wave-guide;
- 20 (8) a first grounding plate mounted on said substrate on a side of said first leg
- 21 light wave-guide opposite said bio-potential plate;

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22 (9) a second grounding plate mounted on said substrate on a side of said

- second leg light wave-guide opposite said bio-potential plate;
- 24 (10) a pick-up pad electrically connected to said bio-potential plate; and
- 25 e) a photodetector for receiving and converting said modulated light output from said
- 26 electro-optic modulator into an electrical output.
- 1 29. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 28 wherein said Mach-Zehnder interferometer operates in a linear
- 3 region.
  - 30. (Canceled)
- 1 31. (Previously Amended) The high impedance optical electrode for measuring bio-
- 2 potentials according to claim 28 wherein said substrate is crystalline.
  - 32. (Canceled)
- 1 33. (Previously Amended) The high impedance optical electrode for measuring bio-
- 2 potentials according to claim 28 wherein said crystalline substrate comprises LiNbO<sub>3</sub>.
  - 34. (Canceled)
- 1 35. (Previously Amended) The high impedance optical electrode for measuring bio-
- 2 potentials according to claim 28 wherein said grounding plates are connected to a
- 3 ground return provided by a housing.

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## 36. (Canceled)

- 1 37. (Currently Amended) The high impedance optical electrode for measuring bio-
- 2 potentials according to claim 28 further comprising of a shunt resistor connected to said
- 3 bio-potential plate and said grounding plate.
- 1 38. (Previously Amended) A high impedance optical electrode for measuring bio-
- 2 potentials comprising:
- 3 a) a light source;
- 4 b) a bio-potential;
- 5 c) an electro-optic modulator;
- 6 (1) receiving light from said light source;
- 7 (2) modulating said light in response to said bio-potential; and
- 8 (3) providing a modulated light output;
- 9 d) wherein said electro-optic modulator is a Mach-Zehnder interferometer comprising a
- 10 substrate having formed therein:
- 11 (1) a light input wave-guide receiving light from said light source;
- 12 (2) a splitter connected to said light input wave-guide;
- 13 (3) a first leg light wave-guide connected to said splitter;
- 14 (4) a second leg light wave-guide connected to said splitter;
- 15 (5) a combiner connected for receiving light from said first leg light wave-guide
- and said second leg light wave-guide; and
- 17 (6) a light output wave-guide connected to said combiner; and
- 18 e) a photodetector for receiving and converting said modulated light output from said
- 19 electro-optic modulator into an electrical output; and
- 20 f) a spatial filter mounted to an end of said substrate.

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1 39. (Previously Amended) The high impedance optical electrode for measuring bio-

- 2 potentials according to claim 38 further comprising a strap for securing said electro-
- 3 optic modulator to a patient.
- 1 40. (Previously Amended) The high impedance optical electrode for measuring bio-
- 2 potentials according to claim 38 further comprising a helmet for positioning said electro-
- 3 optic modulator on a patient.
- 1 41. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 40 wherein said helmet provides a ground return for said electro-
- 3 optic modulator.
- 1 42. (Previously Amended) A high impedance optical electrode for measuring bio-
- 2 potentials comprising:
- 3 a) a light source;
- 4 b) a bio-potential;
- 5 c) an electro-optic modulator;
- 6 (1) receiving light from said light source;
- 7 (2) modulating said light in response to a bio-potential; and
- 8 (3) providing a modulated light output;
- 9 d) a photodetector for receiving and converting said modulated light output from said
- 10 electro-optic modulator into an electrical output; and
- 11 e) a bio-potential plate for receiving said bio-potential and modulating said light in
- 12 response thereto.

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- 1 43. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 42 wherein said bio-potential plate is electrically connected to a pick-
- 3 up pad for acquiring said bio-potential.
- 1 44. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 43 wherein said pick-up pad is used without conductive ointments.
- 1 45. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 43 wherein said pick-up pad has an irregular surface.
- 1 46. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 43 with said pick-up pad comprising an electrically conducting disk.
- 1 47. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 43 wherein said pick-up pad is mounted to a housing for said electro-
- 3 optic modulator.
- 1 48. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 42 wherein said bio-potential plate receives said bio-potential
- 3 through clothing.
- 1 49. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 42 wherein said bio-potential plate receives said bio-potential as a
- 3 result of capacitive coupling.
- 1 50. (Previously Amended) The high impedance optical electrode for measuring bio-
- 2 potentials according to claim 42 further comprising of an optical power splitter for

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3 receiving light from said light source and providing said light to at least two light

4 receiving devices.

- 1 51 (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 50 wherein one of said light-receiving devices is a second
- 3 photodetector.
- 1 52. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 51 wherein said second photodetector is a reference photodetector.
- 1 53. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 50 wherein one of said light receiving devices is a second electro-
- 3 optic modulator.
- 1 54. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 50 wherein said optical splitter comprises an N-splitter.
- 1 55. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 50 wherein said optical splitter comprises an X:Y splitter.
- 1 56. (Previously Amended) The high impedance optical electrode for measuring bio-
- 2 potentials according to claim 42 further comprising a phase modulator receiving light
- 3 from one of the light source and said electro-optic modulator.
- 1 57. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 56 with said phase modulator comprising a piezo-electric substrate

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3 having formed therein a light waveguide with a hot electrode and a ground electrode

4 mounted opposite each other on each side of said waveguide.

1 58. (Original) The high impedance optical electrode for measuring bio-potentials

- 2 according to claim 57 further comprising a frequency generator for imposing a potential
- 3 on said hot electrode with a frequency higher than a frequency range of said bio-
- 4 potential.
- 1 59. (Previously Amended) The high impedance optical electrode for measuring bio-
- 2 potentials according to claim 42 further comprising electronic circuitry for processing
- 3 said electrical output from said photodetector.
- 1 60. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 59 with said electronic circuitry comprising post photodetector
- 3 processing.
- 1 61. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 59 with said electronic circuitry comprising DC transient suppression
- 3 circuitry.
- 1 62. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 59 with said electronic circuitry comprising amplification circuitry.
- 1 63. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 59 with said electronic circuitry comprising filtering circuitry.

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- 1 64. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 59 with said electronic circuitry comprising pilot tone generation
- 3 circuitry.
- 1 65. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 59 wherein a pilot tone from said pilot tone generation circuitry is
- 3 superimposed on said bio-potential at a frequency outside of the frequency range of
- 4 said bio-potential.
- 1 66. (Original) The high impedance optical electrode for measuring bio-potentials
- 2 according to claim 65 wherein said pilot tone is applied directly to a patient.
- 1 67. (Previously Presented) An optical electrode for measuring bio-potentials
- 2 comprising:
- 3 a) a low coherent laser diode light source;
- 4 b) a bio-potential;
- 5 c) an electro-optic modulator;
- 6 (1) receiving light from said light source;
- 7 (2) modulating said light in response to a bio-potential; and
- 8 (3) providing a modulated light output;
- 9 d) a photodetector for receiving and converting said modulated light output from said
- 10 electro-optic modulator into an electrical output.